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International application number: PCT/US2005/020205

International filing date: 08 June 2005 (08.06.2005)

Document type: Certified copy of priority document

Document details: Country/Office: US
Number: 60/578,745
Filing date: 10 June 2004 (10.06.2004)

Date of receipt at the International Bureau: 22 May 2006 (22.05.2006)

Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b)

1466240

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APPLICATION NUMBER: *60/578,745*
FILING DATE: *June 10, 2004*
RELATED PCT APPLICATION NUMBER: *PCT/US05/20205*

THE COUNTRY CODE AND NUMBER OF YOUR PRIORITY APPLICATION, TO BE USED FOR FILING ABROAD UNDER THE PARIS CONVENTION, IS *US60/578,745*

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PROVISIONAL APPLICATION FOR PATENT COVER SHEET
This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

Express Mail Label No. EV453031204US

INVENTOR(S)

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Additional inventors are being named on the _____0_____ *separately numbered sheets attached hereto*

TITLE OF THE INVENTION (500 characters max)

METHOD AND APPARATUS FOR DETECTING SOURCES OF PROJECTILES

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ENCLOSED APPLICATION PARTS (check all that apply)

[✔] Specification *Number of Pages* 5   [ ] CD(s), Number _____

[✔] Drawing(s) *Number of Sheets* 1   [ ] Other (specify) _____

[ ] Application Data Sheet. See 37 CFR 1.76

METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT

[ ] Applicant claims small entity status. See 37 CFR 1.27.

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The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

[✔] No.

[ ] Yes, the name of the U.S. Government agency and the Government contract number are: _____

[Page 1 of 2]

Respectfully submitted.

SIGNATURE _____   Date 6/10/04

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METHOD AND APPARATUS FOR DETECTING
SOURCES OF PROJECTILES

Cross Reference to Related Application

This application is related to US Patent Application Serial No. PCT/US03/04092,

filed February 12, 2003, entitled "Method to Detect and Determine Bearing to a Rocket

Launch or Muzzle Blast", the contents of which are incorporated herein by reference.

Background of the Invention

1. Field of the Invention.

The present invention relates to methods and apparatus for measuring the

occurrence and location of physical events. More particularly, the present application

relates to methods and apparatus for detecting the firing event and the source of the

firing event of bullets or other projectiles.

2. Brief Description of Prior Developments.

For military or law enforcement purposes, many occasions exist in which it would

be advantageous to ascertain the location of the source of hostile or even friendly

small arms fire.

The prior art discloses the use of acoustic sensors for detecting the firing of

bullets. US Patent No. 6,178,141, for example, discloses a system utilizing a

distributed array of acoustic sensors to detect the projectile's shock wave and the

muzzle blast from a firearm. The detection of the shock wave and muzzle blast is

used to measure the wave arrival times of each waveform type at the sensors. This

time of arrival (TOA) information for the shock wave and blast wave are used to

determine the projectile's trajectory and a line of bearing to the origin of the projectile. Such systems may not, however, be entirely successful for all purposes.

A need, therefore, exists for an improved method and apparatus for detecting the source of a bullet or other projectile.

Summary of Invention

The present invention is a method for detecting the source of a bullet or other projectile. This method comprises the step of first establishing an array of passive electrical field sensors and then sensing the presence of the bullet as it passes this array of passive electrical field sensors. Data obtained from this array of passive electrical field sensors is used to determine a trajectory for the bullet. This trajectory is then used to determine the source of the bullet. A processor may also be used to enable a gimbal to point a laser to the source of the bullet.

Brief Description of the Drawings

The present invention is further described with reference to the accompanying drawings wherein:

Fig. 1 is a schematic block diagram showing a preferred embodiment of the apparatus of the present invention.

Detailed Description of the Preferred Embodiment

Referring to Fig. 1, a two-dimensional or three-dimension array of passive electrical field sensors 10 senses the bullet as it passes the array of the sensors. The time of closest approach is determined by each sensor. Using these times of closest from each of the sensors, the processor 12 determines the trajectory of the bullet. The processor 12 then sends pointing information to a gimbal 14 which aims the laser 16 and turns on (or modulates) the laser. The laser 16 may be either a visual light or an infrared (IR) laser.

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An optional inertial measurement unit 18 can provide real-time corrections for the gimbal to stabilize the designation point if this system is mounted on a moving vehicle. The source of the bullet and the shooter's location will be visible by all friendly forces allowing any of them to take corrective action relative to the shooter. If the laser is IR, the shooter is not likely to know that he is being designated and that corrective action by friendly forces is about to take place. A display 20 also provided.

It will be appreciated that a method and apparatus has been described for quickly, easily, accurately, and cost effectively locating the source of a bullet or other projectile.

While the present invention has been described in connection with the preferred embodiments of the various figures, it is to be understood that other similar embodiments may be used or modifications and additions may be made to the described embodiment for performing the same function of the present invention without deviating therefrom. Therefore, the present invention should not be limited to any single embodiment, but rather construed in breadth and scope in accordance with the recitation of the appended claims.

Claims

What is claimed is:

1. A method for detecting the source of a bullet or other projectile comprising the steps of:

   establishing an array of passive electrical field sensors and sensing the presence of the bullet as it passes said array of passive electrical field sensors;

   using data obtained from said array of passive electrical field sensors to determine a trajectory for said bullet;

   using the said trajectory to determine the source of the bullet.

2. The method of claim 1 wherein the array is a two dimensional array.

3. The method of claim 1 wherein the array is a three dimensional array.

4. The method of claim 1 wherein a laser indicates the source of the bullet.

5. The method of claim 4 wherein the laser is an infrared (IR) laser.

6. The method of claim 4 wherein the laser is a visible light laser

7. The method of claim 4 wherein the laser is pointed by a gimbal.

8. The method of claim 7 wherein a processor sends pointing information to the gimbal.

9. The method of claim 8 wherein an inertial measurement unit provides real-time positional corrections to the gimbal.

Abstract

A method for detecting the source of a bullet or other projectile. This method comprises the step of first establishing an array of passive electrical field sensors and then sensing the presence of the bullet as it passes this array of passive electrical field sensors. Data obtained from this array of passive electrical field sensors is used to determine a trajectory for the bullet. This trajectory is then used to determine the source of the bullet. A processor may also be used to enable a gimbal to point a laser to the source of the bullet.
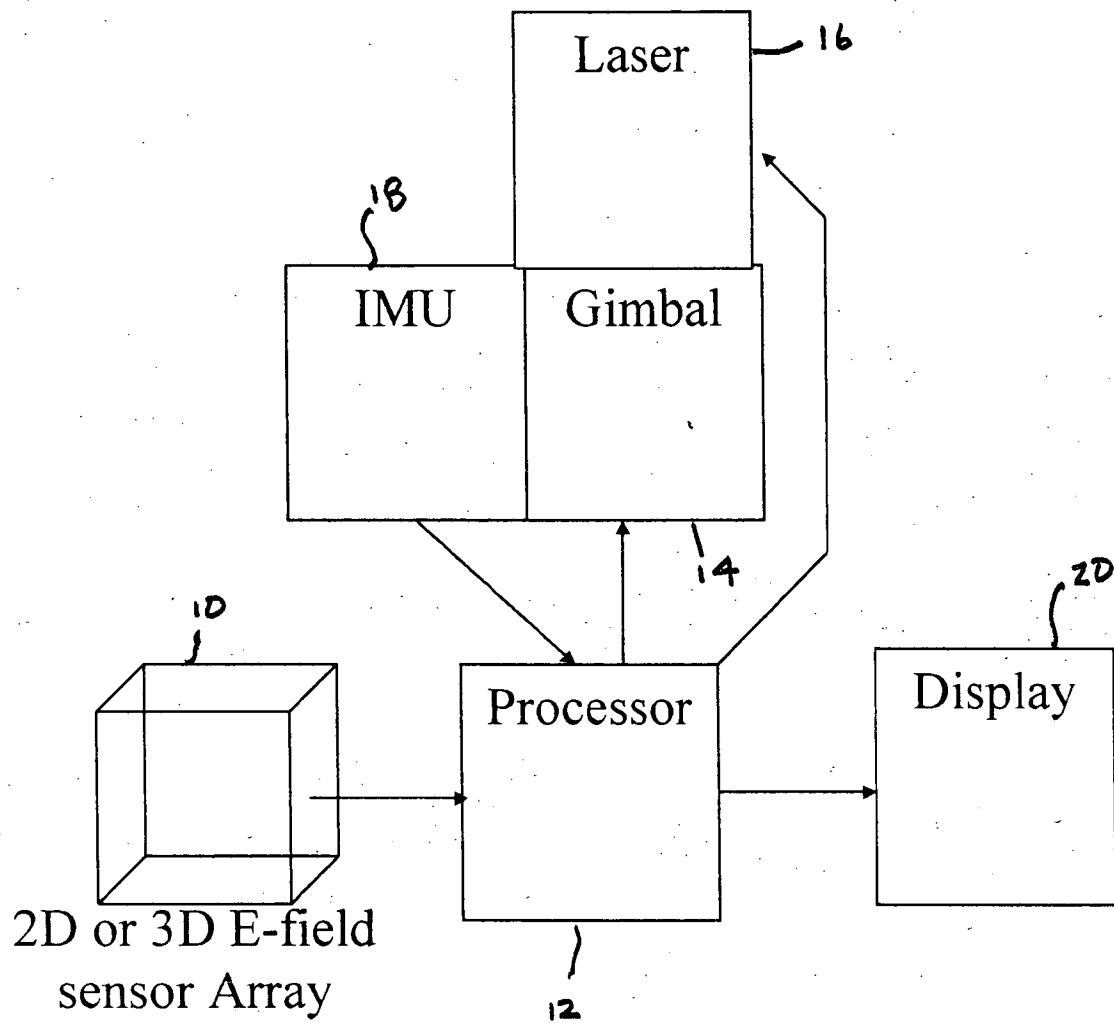
Laser ⟶ 16

IMU ⟝ 18

Gimbal

14

20
Display

10
2D or 3D E-field
sensor Array

Processor

12

FIG. 1